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Remarks

Claims 1-70 remain in the application. Claims 71-80 have been cancelled as being drawn to a non-elected invention, but with no implication that applicants have abandoned pursuit of a patent on this invention.

In the Rule 1.116 Amendment filed earlier, Claims 1, 31 and 61 have been amended to move the description of "interior support structure" from further down in the claims up to follow the first appearance of "interior support structure" in the claims, and to change "internal" to "interior" and to provide consistent antecedent basis. Claims 31 and 61 are also amended to remove inadvertently overlooked superfluous words in the first line of the claims. Claims 2, 32 and 62 are amended to add the word "interior" before "support structure."

Also, in the Rule 1.116 Amendment filed earlier, paragraph spanning pages 4 and 5 of the specification has been amended to insert , an interior support structure, welded to a top surface of the tip plate for supporting the tip plate, after the words "internal supports, basis for this amendment being found in lines 7 and 8 original claim 1, the original claims being a part of the original specification and disclosure.

In this Amendment, claims1, 31 and 61 have been further amended to delete "without the same number of tips" and to require that the internal support structure forms at least 24 cells in the bushing, basis for this found in the specification at page 8 in the third paragraph of the Summary. Also, claim 63 has been amended to require the bushing to have at least 4030 tips, basis found in the specification at page 36, first line of the second paragraph.

The invention of the present claims is a bushing for receiving a molten material and for fiberizing the molten material, such as molten glass, comprising at least two opposed sidewalls and at least two opposed end walls, a tip plate having at at least 1600 orifices with at least 1600 hollow tips extending from a lower surface, the tip plate being attached to the sidewalls and end walls, the bushing having a boxlike shape having at least four interior corners, an interior support structure welded to a top surface of the tip plate for supporting the tip plate, the support structure forming at least 16 cells located between the bottom of a screen resting on, or mounted very near the top of, the top of the interior support structure. The interior support structure comprises a plurality of intersecting or crossing internal supports with angles between the intersecting supports at each intersection, the internal support structure, in cooperation with the at least one sidewall and the at least one end wall. The screen has a plurality of screen areas containing holes through the screen with a screen area above each of the at least 24 cells formed by the internal support structure. The hole area, per unit screen area, being different in some of the screen areas than in other screen areas to achieve more uniform tip plate temperature profile. Key features of the invention are the presence of a relatively large number of separate cells beneath the screen and then locating the screen of the invention in the bushing such that the bottom of the screen is resting on the top of the support structure, or mounted so close to the top of the support structure that the distance therebetween is less that that at which lateral flow of molten glass from one cell to one or more adjacent cells becomes significant to maintaining optimization of tip plate temperature profile, or is resting on the top of a conventional screen that is resting on the top of the support structure. The bushings of the invention advance the art by providing much better control and uniformity of temperature of the molten glass at the tip plate using these key features than had heretofore been possible using the bushings and teachings of the prior art which did not reflect any concern for lateral flow of molten glass beneath the screen.

Figure 11 was objected to because the numeral 104 was used to identify two different items. Proposed replacement Figure 11 attached uses 118 to identify one of the elements objected to and the number 119 to identify the other element objected to. The The Replacement Sheet for Figure 11 was inadvertently not attached to the prior amendment and is attached to this Amendment. Amendment to the appropriate part of the specification correcting the element numbers in accordance with the Replacement Sheet was done in the previous amendment filed Oct. 6, 2006. Applicants believe that Figure 11 is now in compliance with the Rules for drawings and respectfully requests the Examiner to withdraw the objection to the drawings.

Claims 2, 32, and 62 stand rejected under 35USC112, first paragraph, as failing to comply with the written description requirement, the Examiner urging that the specification does not contain basis for a conventional screen lays on top of a "support structure." The description of the "interior support structure" is found in original claim 1 as comprising a plurality of intersecting or crossing internal supports with angles between the intersecting supports at each intersection. The amendment to the paragraph spanning pages 4 and 5 of the specification places the term "interior support structure" in the specification containing the description of the interior support structure.

In the Advisory action, the Examiner states that the basis of the 35 USC 112 rejection is "a conventional screen laying on the support structure" and that applicants had not pointed out support for that embodiment. Basis for that arrangement can be found in the specification in the last paragraph of page 9, the following paragraph and in the first paragraph of page 28. Also, the first paragraph on page 7 states that the screen can simply lay on top of (or is mounted very near) the internal support structure. When one screen lays on top of a conventional screen, the conventional screen can lay on top of the internal support structure.

Applicant believes that the term interior support structure is described in accordance with 35USC112 In original claim 1, which is part of the specification as filed, and therefore respectfully requests the Examiner to withdraw this rejection.

Claims 1-70 stand rejected under 35USC 112, second paragraph, as being indefinite because claims 1, 31 and 61 recites the limitation "the interior support structure" in line 8, but there is insufficient antecedent basis for this limitation. If applicants understand this rejection accurately it appears that the Examiner overlooked the term "an interior support structure" in line 6 of claims 1 and 31 and line 7 of claim 61. Applicants believe that the term "the interior support structure" does have antecedent basis and respectfully requests the Examiner to withdraw this rejection.

Claims 1-70 were rejected under 35 USC 103 as being unpatentable over Coggin, Jr. In viewof Harris or Stalego and Hanna (EP '225). This rejection is traversed. The Examiner urges that Coggin teaches a bushing having a tip plate and a screen wherein the entire bottom of the screen rests on top of an interior support structure that cooperates with at least one sidewall and one end wall to form cells between the bottom of the screen and the top of the tip plate, disclosing tips or nozzles extending from a lower surface of a tip plate. Coggin's disclosed bushing that the Examiner uses in the rejection does not have a tip plate with tips or nozzles extending from a lower surface of the orifice plate 38 as apparent in different places in the specification and most particularly lines 24-26 of col. 4, where it is stated, "The undersurface of the orifice plate is planar (i.e. flat) over the entire drawing area 40 and no nozzles or tips protrude therefrom" (emphasis added). Maybe the Examiner confused the nozzles in Fig. 1A with the tips in the claimed bushing, but the nozzle 68 of Fig. 1A in Coggin refers to a bulk gas assembly having the purpose of directing a cooling gas into the array of fibers coming from the orifice plate 38, see col. 6, line 54 through col. 7, line 37. The Examiner

may have misunderstood the molten glass meniscuses, the top portion of 10a in Figure 5 as tips, but that is molten glass that forms beneath each orifice in the orifice plate and is pulled into the shape of an inverted cone by the pulling of the fibers from each orifice. The type of bushing disclosed in Coggin is a completely different kind of bushing than the claimed tip plate bushings, see the Exhibit attached containing pages 143-148, particularly the discussion of the "C" process on pages 145-148, of THE MANUFACTURING TECHNOLOGY OF CONTINUOUS GLASS FIBRES by K.L. Loewenstein, published by Elsevier, 1983. This type of flat plate bushing is not used very much, and when used, is used only for making fibers having diameters exceeding about 14 or16 microns for the reasons described by Loewenstein, i.e. that the bushing is prone to frequent flooding of the glass across the bottom of the orifice plate when a fiber breaks out, resulting in very costly down time and requiring more bushing operators than tip type bushings of the type improved by the claimed invention.

Also note from the Examples in col. 7-8 of Coggin, that the dimensions of the drawing area, the area of the orifice plate containing orifices, is at most 4.5 inches and that the internal supports (ribs) 44 are spaced on at least 0.7 inch centers. Looking at Figures 4 and 5, there would be a maximum of 6 or 7 cells in the Coggin bushing. Also note that Coggin teaches placing holes, aperatures 52 in the ribs 44 permitting "relatively unrestricted flow of molten glass through the ribs 44", permitting "glass to flow freely through the ribs and assures that the segments of the orifice plate between the ribs will be supplied with molten glass, even if a segment of the reinforcing plate should become blocked." Given this disclosure, an ordinary skilled artisan would not only not look to Coggin to improve a tip plate bushing, but would be led away from the claimed iinvention if the Coggin teachings were followed.

The Examiner urges that both Harris and Stelago teach a bushing screen having a plurality of screen areas with the hole area per unit area of screen area being different

In some areas than in other screen areas and that Stelago additionally teaches that a screen area closest to each bushing corner and end wall has a hole area per unit screen area that is substantially greater than that of the screen areas that are closest to the centerline of the screen. The Examiner acknowledges that neither Harris or Stelago teach an internal support structure attached to the tip plate, particularly an internal support structure forming at least 16 cells, but that Hanna et al teach such a support structure and that it would have been obvious to have used Hanna et al's support structure in the bushings taught by either Harris or Stalego to achieve better support for the tip plate in these bushings. This rejection, and the potential rejection that it would have been obvious to have used the teachings of either Harris or Stalego re their bushing screens to have modified the bushing screen of Hanna et al such that the hole area in some screen areas above cells is different than hole areas per screen area of other screen areas, are respectfully traversed.

Harris teaches bushings having up to 800 tips receiving solid glass marbles or other solid shapes and for melting the solid glass shapes in a melting chamber 22 in the bushing and on a baffle 24. The baffle 24 has different sized holes therethrough for the purpose of improving the temperature uniformity of the tip plate. When melting glass inside the bushing, the temperature of the molten glass varies substantially more than the molten glass coming into the bushing from a bushing leg of a melting furnace. In the Harris bushing, the bottom of the baffle 24 is located a substantial distance from the top of the tip plate 15. There is no mention or suggestion in Harris of lateral or partially lateral flow of molten glass between the baffle and the tip plate, or how to prevent such flow to achieve the maximum effect of the baffle defined by Harris. Since Hanna et al teaches at col. 8, lines 45-49, that the invention makes bushings having 1600 or more orifices perform in a substantially superior manner, it is unlikely that one of ordinary skill in the art would find it obvious to apply the very expensive support structure of Hanna et

al to the 800 tip bushings taught by Harris. The support structure of Hanna et al is made from alloys of platinum and rhodium, preferably 80% Pt and 20% Rh. The prices/cost of Pt and Rh vary somewhat from time to time, but are always very expensive. For example, the current price of Pt is $1,186 per troy ounce and the cost of Rh is $5,350 per troy ounce. Tip plate sag is not a substantial problem in a 600-800 tip bushing and would not justify so costly an internal support structure. The same is true of Stalego who teaches a bushing that appears to have far fewer tips. Also importantly, nothing in Harris or Stalego suggests any need to form cells beneath the screen.

Even if the Examiner should reject on the basis that one of ordinary skill in the art would believe it obvious to use the teachings of Harris in the bushings taught by Hanna, there is no basis for such a conclusion and further the claimed invention would not be produced, see Figs. 2 and 2 A of Hanna et al and the figure in Harris. The bushing of Harris does not receive molten material, but rather receives unmelted, solid pieces of glass such as marbles, see col. 2, lines 67-70, and melts the solid glass while the solid pieces of glass lay on the baffle 24. As the glass melts and reaches a sufficiently low viscosity the molten glass flows through the holes in the basket 24 and down into the space above the tip plate 15. Harris teaches that the ends of this bushing tend to be of substantially higher temperature than intermediate portions, see col. 3, lines 21-24 and lines 34-38. One of ordinary skill in the art would recognize that most or all of this situation is the result of the solid glass being introduced through only two inlets 16 that are spaced from the ends of the bushing and that the cold, solid glass therefore cools off the center portion of the bushing to a much greater extent than the ends. Thus, one of ordinary skill in the art would not look to Harris to improve a much larger bushing that receives molten glass material already at or near fiberizing temperatures and also because Harris teaches in col. 3, lines 47-59, a higher open area per unit of screen at the end regions of the baffle 24 than the open area per unit of screen area in the center

region of the baffle, thus would clearly lead one skilled in the art away from the claimed invention, i.e. Harris teaches using larger holes in the screen in areas that are at the highest temperature, see col. 3, lines 47-59.

Stalego, Figures 4-5, discloses a bushing for receiving molten glass from a bushing leg, but the heater strip 78 taught is corrugated or a multiple V-shaped configuration to provide substantial area of contact with the molten glass, please see col. 6, lines 35-50. These heater strip configurations taught by Stalego leave substantial distance between all of the holes in the heater strip 78 and the top of the tip plate 15, see Fig. 5, allowing a free lateral or partially lateral flow direction of the molten glass and for mixing of the molten glass coming from the various holes of different diameter, which would frustrate the object of the presently claimed invention, please see the present specification at page 3, lines 25-27 and page 4, lines 12-17. Note that the rods 86 end far above the top surface of the tip plate 66. Nothing in the references cited suggests to one of ordinary skill in this art to modify the bushing of Stalego to produce the bushing structure claimed in this application or the claimed method of making the Stalego bushing. Also, the heater strips disclosed by Stalego have at most 6 areas of screen (Fig. 8) and only 3 areas of different hole size whereas the present invention provides the capability of having at least 24 screen areas capable of having different hole sizes, or other flow control parameters that will much more effectively influence the temperature of the tip plate than the 6 areas taught by Stalego because the entire screen is mounted on or near the support structure.

Also, please see Board of Appeals Decision, Appeal No. 2000-0035, re the reversal of previous rejections of bushing claims containing one or more screens like, or similar, to the screens used in the present invention as being unpatentable under 35 USC 102 as being anticipated by the same Stalego patent cited in this application, and as being

unpatentable under 35 USC 103 as being obvious over the teachings of this same Stalego patent.

Given the above differences in the bushings taught by the references and the directions one of ordinary skill in the art is lead by each of these references, applicants further contend that this rejection is an improper hindsight rejection using applicants' own disclosure as a "road map" or "template" to find references the Examiner believes shows the various parts of the claimed invention and then improperly combining those references to obtain the invention even though one or ordinary skill in the art would not arrive at the claimed invention from the reasonable interpretation of the teachings of those references.

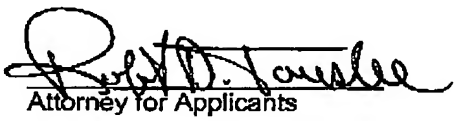
For these reasons Applicants believe the present claims are patentable under 35 USC 103 over Coggins in view of Harris or Stalego and Hanna et al and respectfully requests the Examiner to withdraw this rejection and to allow all of the claims.

Claims 1, 31, and 61 stand provisionally rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 2 and 21 of co-pending application No. 08/929,836 and claims 25, 27, 29 and 31 of co-pending application Serial No. 10/421,683 in view of Coggin, Jr. and Hanna et al. This rejection is traversed for the reasons given above in response to the rejection under 35USC103, applicants do not believe that the claimed invention is made obvious by the teachings of Coggin, Jr. and Hanna et al. Applicants further contend that this rejection is an improper hindsight rejection using applicants present specification as a "road map" or "template" to find references the Examiner believes teaches the various parts of the claimed invention and then improperly combining those references to obtain the invention even though one or ordinary skill in the art would not arrive at the claimed invention from the reasonable

teachings of those references. For these reasons applicants believe that the claimed invention is not subject to an obviousness-type double patenting rejection and respectfully requests the Examiner to withdraw this rejection and to allow all of the claims.

Applicant's attorney believes that the amended claims above address all of the Examiner's reasons for rejection and are now in condition for allowance. If the Examiner believes that still further changes are needed, applicant's attorney invites a telephone interview to expedite the disposal of this application.

Respectfully submitted,



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